

## WHAT IS CLAIMED IS:

1. A method of modifying a plant phenotype, comprising:  
transforming a plant to alter the level of expression of non-symbiotic plant hemoglobin in the plant as compared to a non-transformed plant that is not transformed to alter the level of expression of non-symbiotic plant hemoglobin, thereby yielding a transformed plant,  
wherein said transformed plant exhibits, under normal oxygen conditions, a plant phenotype that is modified as compared to said non-transformed plant,  
wherein if said phenotype is a root phenotype, said phenotype is selected from the group consisting of apical dominance and taproot width.
2. The method of claim 1, wherein said plant phenotype is selected from the group consisting of shoot or root apical dominance, taproot width, leaf size, leaf length, plant shape, erect versus prostrate growing habit, flower color, early versus late flowering, chlorophyll content, and combinations thereof.
3. The method of claim 1, wherein said plant phenotype is a plant growth characteristic selected from the group consisting of cell-cycle initiation, cell differentiation, cell elongation, time to reproductive maturity, time from vegetative to reproductive development, and combinations thereof.
4. The method of claim 1, wherein said plant phenotype is a plant characteristic selected from the group consisting of vegetative growth and yield.
5. The method of claim 1, wherein said plant phenotype is the relative proportions of one or more plant components selected from the group consisting of leaf, stem, and reproductive tissue.
6. The method of claim 1, wherein said plant phenotype is the plant's uptake, concentration or metabolism of nutrients.

7. The method of claim 1, wherein said transformed plant exhibits an increased level of expression of non-symbiotic hemoglobin as compared to said non-transformed plant.
8. The method of claim 7, wherein said transformed plant exhibits increased shoot apical dominance under normal oxygen conditions as compared to said non-transformed plant.
9. The method of claim 7, wherein said transformed plant exhibits earlier vigorous growth under normal oxygen conditions as compared to said non-transformed plant.
10. The method of claim 7, wherein said transformed plant exhibits increased nutrient uptake under normal oxygen conditions as compared to said non-transformed plant.
11. The method of claim 7, wherein said transformed plants exhibit earlier flowering under normal oxygen conditions as compared to said non-transformed plant.
12. The method of claim 7, wherein said transformed plants exhibit reduced flower pigmentation under normal oxygen conditions as compared to said non-transformed plant.
13. The method of claim 1, wherein said transformed plant exhibits a decreased level of expression of non-symbiotic hemoglobin as compared to said non-transformed plant.
14. The method of claim 13, wherein said transformed plant exhibits a more prostrate growing habit under normal oxygen conditions as compared to said non-transformed plant.

15. The method of claim 13, wherein said transformed plant exhibits greater iron uptake under normal oxygen conditions as compared to said non-transformed plant.

16. The method of claim 7, wherein said method comprises transforming said plant with an expression system comprising a nucleic acid molecule encoding a plant nonsymbiotic hemoglobin.

17. The method of claim 13, wherein said method comprises transforming said plant with an expression system comprising an antisense plant nonsymbiotic hemoglobin nucleic acid molecule.

18. A plant transformed in accordance with the method of claim 1, exhibiting a modified phenotype under normal oxygen conditions as compared to a non-transformed plant that is not transformed to alter the level of expression of non-symbiotic plant hemoglobin.

19. The transformed plant of claim 18, wherein the plant exhibits an increased level of expression of non-symbiotic hemoglobin as compared to said non-transformed plant.

20. The transformed plant of claim 18, wherein the plant exhibits a decreased level of expression of non-symbiotic hemoglobin as compared to said non-transformed plant.

21. A method of modifying a response to a plant hormone in a plant, comprising:  
transforming a plant to alter the level of expression of non-symbiotic plant hemoglobin in the plant as compared to a non-transformed plant that is not transformed to alter the level of expression of non-symbiotic plant hemoglobin, thereby yielding transformed plant,

wherein said transformed plant exhibits, under normal oxygen conditions, an altered response to a plant hormone as compared to said non-transformed plant.

22. The method of claim 21, wherein the altered plant hormone response is a response to a hormone selected from the group consisting of gibberellins, auxins, cytokinins, ABA, brassinosteroids and ethylene.

23. The method of claim 21, wherein said transformed plant exhibits an increased response to a plant hormone as compared to said non-transformed plant.